ÅKERSTRÖMS

Robust Radio remote control

INSTALLATION MANUAL

REMOTUS JUPITER 800/900

FSK12

948182-000 EN -C2

Revision history

Version	Date	Reason
A0	2013-07-04	1st released version
A1	2013-08-13	Changes in pairing (7.2) Micro operation added (7.7)
A2	2013-08-23	150J layout changes 3 & 4 is now A & B
B0	2013-09-09	Changes in section: 6.3, 7.2.1, 7.7, 7.8, and 11.1
B1	2013-11-21	Changes in section 11.1
B2	2014-06-17	Changes of 433-434 radio section: 5, 7.1, 7.2. Clarification in section: 7.8
C0	2014-09-10	Only BQ-radio affecting: section 5 & pairing 7.2, New PLC affecting section 7.8 & 11.1
C1	2014-11-18	Tandem operation; pairing to receiver 2 (B) changed
C2	2014-12-10	Tandem/Multi-operator operation corrected

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1 Introduction

Remotus is Åkerströms product family for radio remote control of safety critical industrial and mobile applications. Remotus Jupiter is Åkerströms' standardized industrial remote control product line.

The manual must be used when installing Åkerströms Remotus system to ensure a secure and safe operation. This manual only covers the installation of the Remotus radio remote control system. Remotus does not include a complete system for remote control: it has only a set of outputs that is controlled by the operator with the transmitter switches and joysticks. How the outputs are used to control the object (for example, a machine's movements and brakes) depend on the specific installation and is out of the scope of the Remotus system.

It is the responsibility of the Systems Integrator or Machine builder to safely incorporate the Remotus radio remote control into the complete system or machine. The System Integration has to be made by qualified personnel applying the appropriate standards for the system or machine including making the necessary safety investigations and risk analysis.

It should be noted that the information obtained from the controlled object is not processed by the Remotus receiver, but is used for informational purposes.

For the reasons stated above, the safety of Remotus covers mainly the status of the relay outputs, regardless of the object that is controlled by the relays.

The interface between Remotus and the controlled object should be a special interface that is not included in Remotus system and therefore is not included in this installation manual.

The approvals for Remotus refer only to the Remotus system not the complete system.

The complete radio control system must be tested and approved in accordance with applicable standards. It is not part of Åkerströms Björbos responsibility.

2 Scope

The Remotus Jupiter system described in this manual consists of one receiver and one transmitter.

	Type	Model	Symbols
Receiver	RX160	J-RX160	
Button transmitter	TX50	J800/900-8B J800/900-9B RS J800/900-9B D RS J800/900-10B J800/900-10BD	Nordic, DIN or CS
Joystick transmitter	MC100	J800/900-100J J800/900-150J J800/900-150JD	Nordic, DIN or CS

3 Use of warnings and notes in this manual

Read all safety instructions throughout this manual and on safety signs attached to this equipment.

Failure to follow all safety instructions could result in death or serious injury.

The safety alert symbol is used to alert about potential personal injury hazards. To avoid hazards, obey all safety messages that follow this symbol. Inform all personnel that are working with the product.

The following safety alert symbols and signal words are used in this manual to inform the user of hazards.

Indicates a potentially risk of high voltage which, if not avoided, could result in death or serious injury or property damage.

Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury or property damage.

!

Indicates a condition which, if not avoided, could result in damage to or poor functionality of the product.

Electrostatic sensitive devices warning tells you about the risk of electrostatic discharge which can cause damage to the product.

4 Warnings regarding installation and maintenance work

This manual must be read and understood before installing and starting the radio remote control system to ensure safe and secure operation.

The installation and/or maintenance work must be carried out by a qualified and educated person in accordance with country installation rules and regulations. Only a correct installation can ensure the necessary level of safety during use.

The equipment can be supplied by different energy sources e.g. for the relay contacts or the regular power supply of the equipment!

Before starting ANY maintenance work ensure by using the external separators / fuses of the permanent installation, that ALL terminal blocks are free from dangerous voltage!

CAUTION DOUBLE POLE/NEUTRAL FUSING

! **If a siren is mounted on the receiver unplug it before any maintenance action. Put it back when the maintenance is done.**

Risk of high noise level, hearing protection required

5 Specifications

Radio:			
Operating frequency:	863-870 MHz	*915-928 MHz*	*433-434 MHz*
Power output:	< 5 mW	*< 3 mW AUS/NZ*	*< 10 mW*
Baud rate:	9600b/s	*9600 b/s*	*9600 b/s*
Transmission principle:	GFSK, TDMA	GFSK, TDMA	GFSK, TDMA
Channel Separation:	25 kHz	25 kHz	25 kHz
Functional sensitivity:	≤-107 dBm BER 10^{-3}	≤-107 dBm BER 10^{-3}	≤-107 dBm BER 10^{-3}
The radio full-fills:	R&TTE Directive 99/5EC		
Receiver RX160:			
16 Relay outputs: • 6 safety relays (NO) for movements • 4 change-over relays (NO/NC) • 6 normally open relays (NO)			
2 Separate main contactor change over safety relays			
1 Digital output for horn (siren), 12V			
1 Analogue input:	0 (4) -20 mA or 0(2)-10 V		
2 Digital inputs:	24/48 V AC/DC (Opto-isolated) or 115/230 V AC (Opto-isolated)		
1 Serial port:	RS422/RS485		
Input voltage:	24/48/115/230 V AC, power consumption less than 14 VA or 24 V DC 0.5 A. Shall be connected to SELV circuits.		
Dimensions:	277x217x115 mm		
Weight:	Approximately 1.6 kg		
Operating temperature:	-25 °C – +55 °C		
Storage temperature:	-40 °C – +85 °C		
Reaction time on STOP function:	Maximum 550 ms		
Safety parameters for STOP function:	ISO 13849-1:2006 Category 3 PL d		
Safety category for unintended movement (UMFS)	ISO 13849-1:2006 Category 3 PL d, possible to achieve with relevant transmitter.		
Transmitter:	**TX50:**		**MC100:**
Dimensions:	243x77x41 (49 mm incl. quick stop)		230x155x135 mm
Weight:	450 g		1.2 kg
Operating Temperature for battery:	-20 °C – +55 °C		-25 °C – +55 °C
Storage Temperature for battery:	-20 °C – +35 °C		-20 °C – +35 °C
Charging Temperature for battery:	+10 °C – +45 °C		+10 °C – +40 °C
	NOTE! For charging see charger documentation		
Display:	Graphical transflective LCD 102*64 pixels		Character display 2x16 characters

Table 1. Technical specifications

5.1 Design

The RX160 receiver consists of a MAIN board, antenna board and a radio module. The radio module is located on top of the MAIN board.

The MAIN board holds all logic components, relays, power supply and the connectors.

The enclosure is made of fire resistant UL 94-5V plastic.

5.2 Functional description

The RX160 receiver has been designed to be a compact unit.

Jupiter 800/900 is available in some standard versions to suit different crane manufacturers.

The dual channel approach gives a high degree of safety. The same fault must occur undetected in both channels (cpu:s) for a non intended movement. To avoid a single fault in the relays (welded contacts) the current through the contacts must be limited by fuses.

Two separate outputs driven by two safety relays are intended for the “main contactor” (MC). The relay contact data is 250 V AC 6A.

On a crane there usually is a main contactor (MC) feeding power to movement contactors. This MC must be activated for other movements to occur. So even if some output relay feeding a movement contactor is welded the movement can be stopped by deactivating the MC.

The receiver is equipped with six safety relays to monitor the safe function of the three moving directions of a crane.

If a non safety relay becomes welded, the crane can begin to move unintendedly. The advantage of using safety relays is that the receiver detects welded contacts trough the relays feedback signal and makes the decision to stop the operation. This will significantly increase the safety of the crane system.

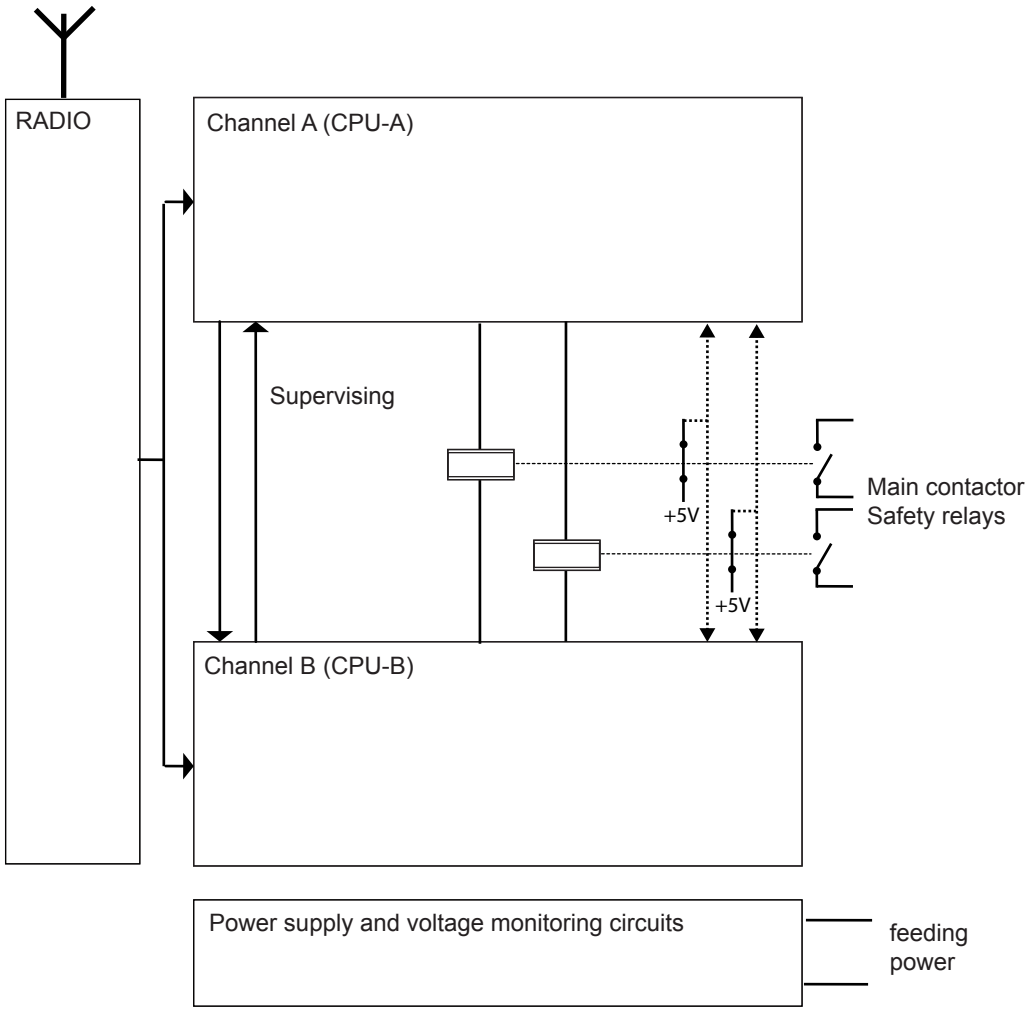


Figure 1. Receiver functional safety description

6 Installation

The permanent installation of the receiver must include fuses to protect the equipment and wiring from over current and short circuit. In detail the power supply of the receiver and all relay contacts must be fused.

All fuses are used as disconnecting devices. The fuses shall be easily accessible, must submit a contact-gap of at least 3.0 mm and have to be placed in the line pole (L). NOTE! The neutral line fuse on the PCBA is NOT sufficient as a disconnecting device. After removal of the fuse, parts of the equipment will remain energized and might represent a hazard during servicing.

6.1 Mechanical installation

Note! Make sure to install any optional accessories inside and/or on the receiver enclosure before mounting the receiver on the crane. Refer to each accessory kit for assembly instructions.

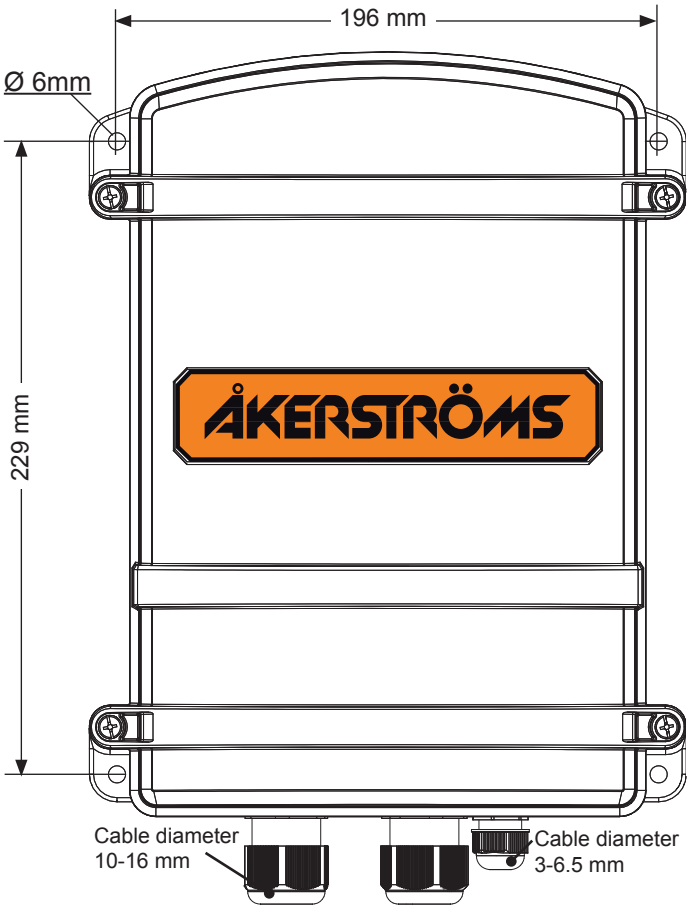
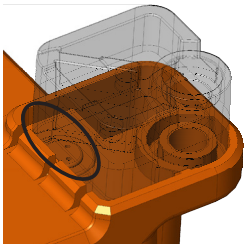


Figure 2. Mount RX160

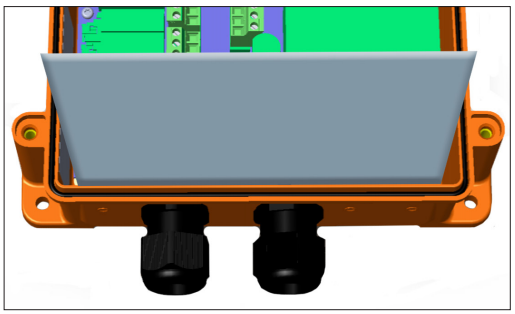
Mount the receiver upright with the cable glands facing down. The receiver shall be mounted on a flat surface with screws suitable for the surrounding environment. Note! If the plastic spacer is mounted the screws needs to be 20 mm longer.

Assembly Instruction - plastic spacer (optional)

Press the plastic spacers firmly to the bottom enclosure. Make sure to align the spacers frame opening with the condensation filter ventilation on the bottom enclosure lower, right side.
4 black plastic spacer art. no: 947504-000.



When drilling the hole for the cable gland, make sure not to damage the printed circuit board or the transformer inside. Place some protection inside the enclosure to stop the drill from damaging the interior.



6.2 Connections and switches on the MAIN board

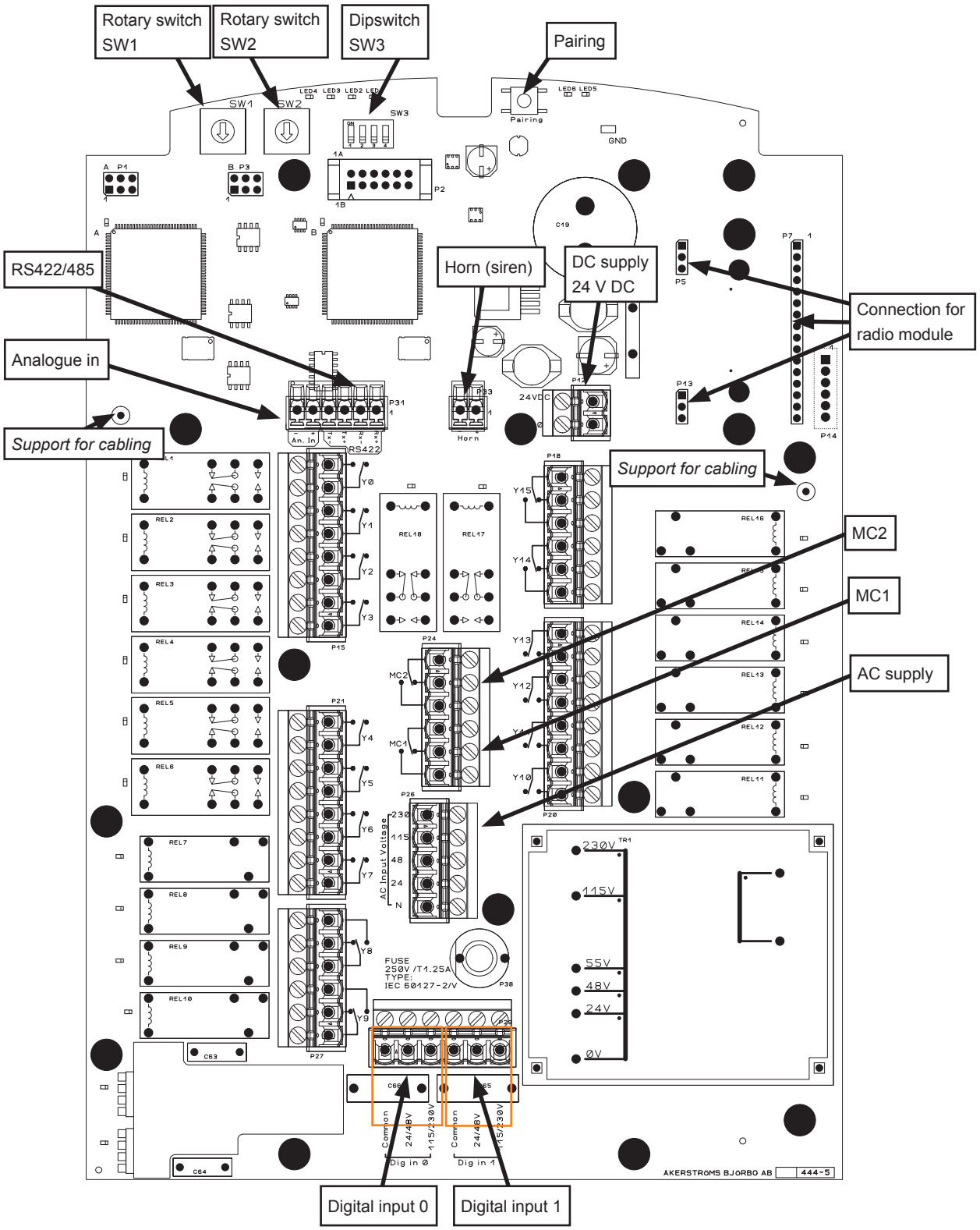


Figure 3. Connections and switches on the MAIN board

6.3 *Cable installation*

If the receiver and/or receiver terminals are connected to more than one line phase the voltage between any connector must NOT exceed 250 V.
If voltage of one phase is 230 V AC the corresponding three phase voltage is 380 V AC and thus NOT allowed.

Max loading by relay may not be over 2 A.

Current loops containing relay contacts SHALL therefore have a protection fuse not higher rated than 6 A.
A protection fuse for the receiver main supply shall be rated 6 A.

Do not mix SELV and NON SELV signals in the same cable.

After the installation of the equipment, the installed cables must be bound together in pairs (e.g. by using a cable tie) very close to the terminal blocks (see Figure 4). This is important if a cable become loose. The cable should not be able to end up in a unsuitable location of the receiver.

Torque 0.4-0.5 Nm.

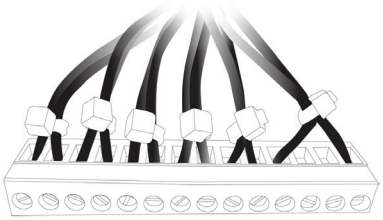
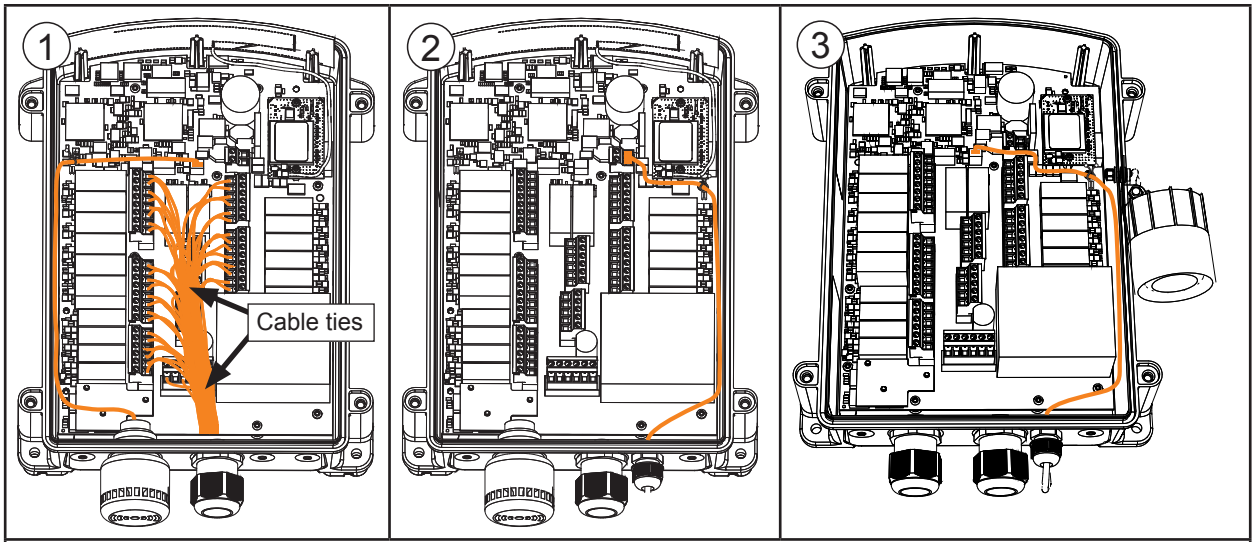


Figure 4. Installation of cables

Cabling



Note! The position of different cable glands can vary depending on combination of accessories.
① **Relay/digital in and hole mounted siren cabling**. Note! Relay cabling, use cable ties not only as in Figure 4 but also to hold them together in the middle. Hole mounted siren cabling to the left.
② **DC supply cabling.** Note! The connection from this supply shall be routed through its own cable gland.
③ **External siren**
RS 422/485 and Analogue in. M12 cable gland at suitable placement. Note! cabling shall be routed to the left or right.
Pigtail for external antenna. BNC chassis connector in the rightmost hole. Note! Cabling shall be routed as shown in ② / ③

For relay terminal and connector number see Figure 3 on page 10.

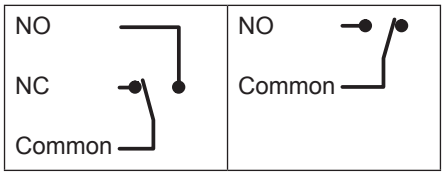


Figure 5. Relay symbol explanation

6.3.1 Functional diagram

The receiver functional diagram shows how to connect the equipment, in this manual the functional diagram is written as different program options, see chapter 11.

6.3.2 Principle connection of the Main contactors

The radio remote control system is, for the safety stop function, designed for category 3 Pl d according to ISO 13849-1:2006. To achieve this safety level for the object (crane) both safety stop outputs MC1 and MC2 shall be used as two separate independent outputs (two safety channels). This means that there must be two main contactors on the machine. See the connection example below.

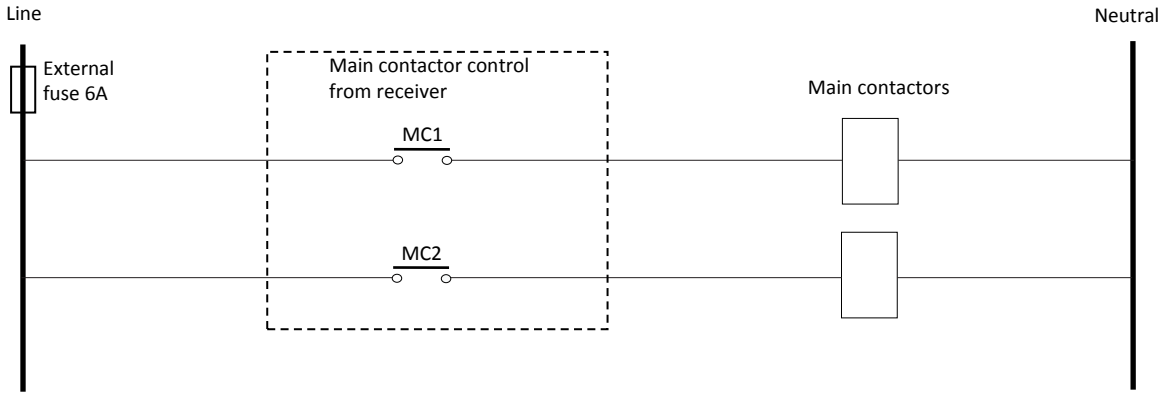


*Figure 6. Connection with the two main contactors in parallel, **category 3***

If category 3 is not desired, the two safety stop outputs MC1 and MC2 shall be used connected in series. See the connection example below. The maximum level of safety for the safety stop function in this case will be category 1.

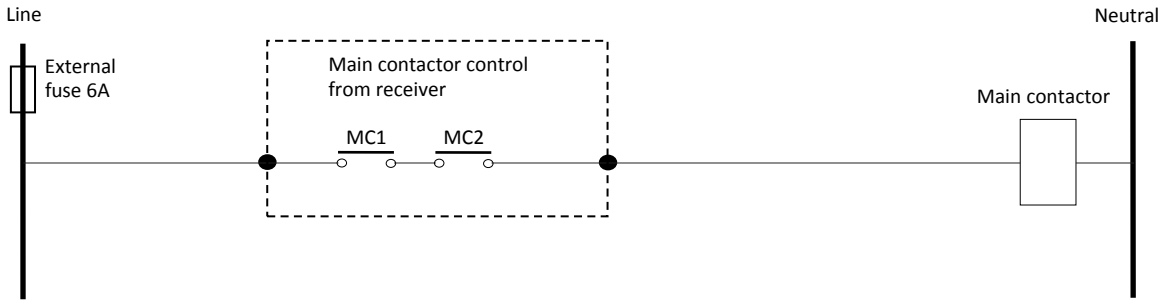
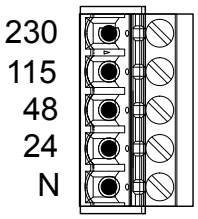


*Figure 7. Connection with the two main contactors in series, **category 1***

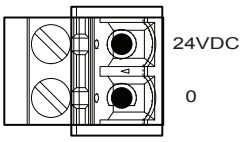
6.3.3 AC supply

Carefully check the power supply voltage level.



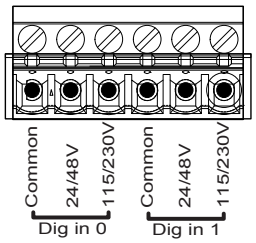
6.3.4 DC supply

The connection cable for the DC supply shall be routed through its own cable gland.
Do not mix with NON SELV signals.



6.3.5 Digital inputs

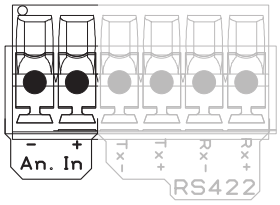
Carefully check the signal voltage level.
These two signals appears as symbols on the transmitter display.



6.3.6 Analogue input

This signal may be used for weight information from a scale, shown on the transmitter's display. See section 9.2 and 9.3.

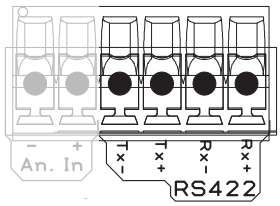
Do not mix with NON SELV signals.



6.3.7 RS422/485

This signal may be used for weight information from a scale, shown on the transmitter's display. See section 9.2 and 9.3.

Do not mix with NON SELV signals.



6.3.8 Connection cable

The cable cross-sectional area shall be at least 0.75 mm² and with an outer insulation diameter of 10-16 mm.

6.4 Antenna placement

The antenna is by default placed internally in Jupiter RX160.

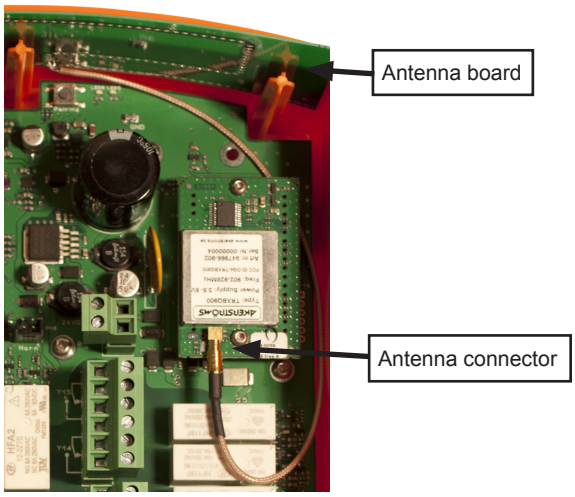


Figure 8. Internal antenna

6.4.1 In case of external antenna placement

When mounting the antenna separately it must be placed as open (in free air) as possible preferably below the crane beam.

A covered antenna contributes to a considerably less effective radio reception. An antenna can not be mounted in a cabinet.

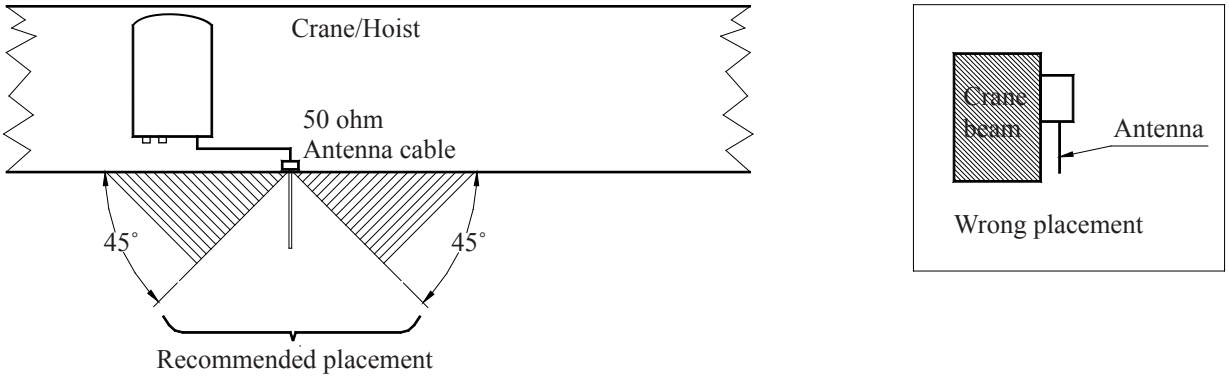


Figure 9. Recommended and wrong placement of the antenna

! The antenna must never come into contact with metal parts.

If the antenna is installed outdoors, there is a risk of dangerous voltages entering the antenna cable. To minimize this risk a DC block shall be used. DC blocks are coaxial components that prevent the flow of low and direct current (DC) frequencies while offering minimum interference to RF signals. Suitable models have capacitors in series with both the inner and outer conductors.

Åkerströms can provide one suitable DC block 944498-000.

7 Commissioning

7.1 *Frequency setting*

The radio transmission used in the Jupiter systems can use either a frequency hopping transmission scheme or scan mode were frequency are automatically selected. The default factory setting is frequency hopping which is recommended for most applications.

Note! The transmitter and receiver must have the same frequency setting.

Frequency hopping
Frequency band 800 uses LBT+AFA frequency hopping transmission.
Frequency band 900 and 400 uses frequency hopping transmission.

AFA - Adaptive Frequency Agility	capability of an equipment to dynamically change the temporary operational channel within its available frequencies for proper operation.
LBT - Listen Before Talk	capability of an equipment to disable transmission on a specific radio channel if the channel is busy.

When frequency hopping is selected, the frequency changes automatically between 15 different frequencies in the frequency-band.

Scan mode

Scan free frequency
Scan free frequency scheme automatically scans between 15 different frequencies and one frequency in the frequency-band will be used. The transmitter changes to a free frequency every time it´s started, as long as the transmitter searches for a free frequency the status indicator glows yellow.

7.1.1 Radio frequency setting in Receiver RX160

Before changes of the frequency setting, disconnect the power.

The SW3 dipswitch for adjusting frequency setting is marked in Figure 3. See Figure 10 for settings.

If switch 2 is set to:

OFF: Frequency hopping
ON: Scan mode, automatically selected frequency

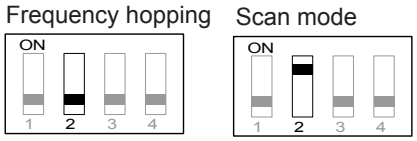


Figure 10. Adjust the frequency setting, switch 2

The receiver RX160 normally uses frequency hopping for radio communication. By watching the indications “Squelch” (LED 4) and “Message received” (LED 3) it is possible to diagnose the quality of the radio channel (see section 9.1 on page 27).

- Every time a message is received the indication “Squelch” lit. The messages are sent at a constant rate. The indication “Squelch” shall lit at this rate. If this isn’t the case some of the channels can be occupied or some of the used frequencies (1 of 15) are not working.
- If the message is accepted by the receiver, indication “Message received” will lit.

If the indication “Message received” does not lit at the same rate as the indication “Squelch” the messages on one or more frequencies are disturbed or distorted.

7.1.2 Radio Frequency Setting in the Push Button Transmitters

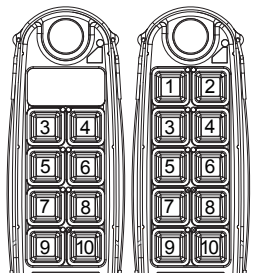
To change the settings do the following:

1. Press button 9 (step 2) and button 8 while pulling up the safety stop button. Hold down the buttons in 3 seconds until the status indicator glows yellow (shall change from green to yellow) showing that the transmitter is in setup-mode.
2. Set all buttons to OFF for frequency hopping or to ON for scan mode, button ON is indicated by the button LED glowing green. See Table 2 for frequency setting.
3. Finish by turning the transmitter off by pushing the safety stop button down.

	PUSH BUTTON								
J-8B:	**10**	**9**	**8**	**7**	**6**	**5**	**4**	**3**	**Frequency**
J-9BRS/10B:	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	
	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	Frequency hopping
	ON	ON	ON	ON	ON	ON	ON	ON	Scan mode

Table 2. Frequency setting in push button transmitter

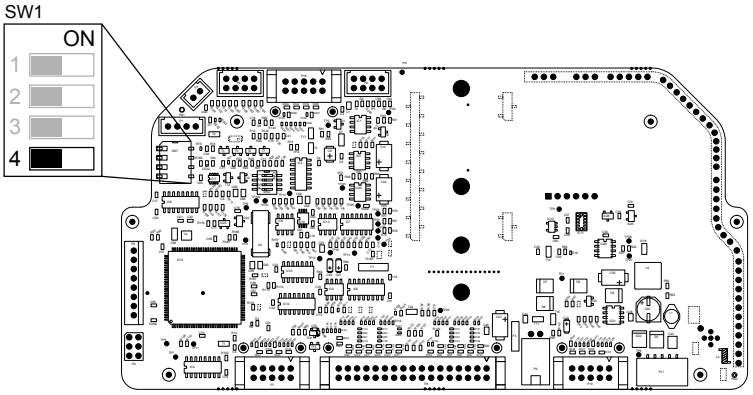
Push button numbering



7.1.3 Radio Frequency Setting in the Joystick Transmitters

To change the settings do the following:

1. Remove the battery. Unscrew the bottom of the transmitter, pull up the bottom of the transmitter carefully. Pull out the connector for the battery and remove the bottom cover entirely.
2. Set dipswitch 1 switch 4 to OFF for frequency hopping and to ON for scan mode.



ON/OFF is marked with small text on the switches. Grey is default positions.

Figure 11. Dipswitch for frequency settings on the joystick transmitters.

3. Insert the connector for the battery. Remount the bottom enclosure; make sure not to damage the battery cable. Tighten the screws 1 Nm. Insert the battery.

7.2 *Pairing of transmitter and receiver*

Open the lid on the receiver. Indications LED 5, 6 and the pairing push button (see Figure 3) on the MAIN board should be used when pairing the receiver and transmitter.

1. Press the pairing button on the receiver.
2. Set the transmitter in pairing mode.
   Button transmitter: Hold down button B9 and B10 when starting the transmitter (9BRS - hold down button B9). Continue to press the buttons for ≈5 seconds, see pairing mode: not paired, Table 4.
   Joystick transmitter: Hold one of the transmitter joysticks out of center position and start the transmitter. While still holding the joystick out of center position, push the start/signal button for ≈5 seconds, see pairing mode: not paired, Table 4.
3. Check the indication “pairing”, see Table 3. When paired LED 5 shows steady green. If this hasn’t been indicated within 15 seconds restart the transmitter.
4. Restart the system to activate the new ID number.

The receiver has now learned the transmitter ID number and will only accept commands from that transmitter.

7.2.1 Pairing indications

Mode	Event	LED indication Receiver	Flash rate
Pairing	In pairing mode	LED 5 steady LED 6 fast	50/50 ms
	Paired	LED 5 steady	

Table 3. Receiver pairing indication

Mode	Event	Status indicator transmitter	Flash rate
In pairing mode	Not paired	Green/yellow	50/50 ms
	Paired	Steady green	

Table 4. Transmitter pairing indication

Pairing:	Pairing ready:	Link timeout:
Pairing Info Pairing...	Pairing Info Pairing ready! Restart system	Pairing Info Pairing failed! Restart system

Table 5. Transmitter display pairing indication

7.2.2 Pair a second ID (for tandem/multi-operator operation)

See section “7.8 Tandem and Multi-operator Operation” on page 21.

7.3 Adjustment of the Push Buttons Remaining and Momentary Functions

The buttons either have momentary functions, which give a signal for only as long as you keep pressing, or remaining functions. The button LED indicates an active remaining function. For the numbering of the buttons see chapter 12.

Note that this function needs support from the receiver PLC. Before changing these parameters, check the program options. Only qualified personnel may make these changes.

1. Press button 9 (step 2) and button 7 while releasing the safety stop button. Hold down the buttons in 3 seconds until the status indicator glows yellow (shall change from green to yellow) showing that the transmitter is in setup-mode.
2. Then press down the buttons for which you want to have a remaining function and the button LED will light up.
3. Restart the transmitter.

7.4 PIN Code Configuration of the Push Button Transmitter

The transmitter is equipped with a user configurable PIN-lock to prevent unauthorized access to the system. The PIN-lock is disabled by default. For numbering of the buttons see chapter 12.

J-8B	
B3=	1
B4=	2
B5=	3
B6=	4
B7=	5
B8=	6

J-9BRS/10B	
B1=	1
B2=	2
B3=	3
B4=	4
B5=	5
B6=	6
B7=	7
B8=	8

Table 6. Numeric numbering of the buttons

7.4.1 Enable PIN code

1. Press button 9 (step 2) and button 6 while releasing the safety stop button. Hold the buttons for 3 seconds until the status indicator indicates configuration mode (glows yellow). When entering this mode the two top buttons LED will be lit.
2. Enter the factory setting 3333.
3. If PIN OK (8B:L5, 9BRS/10B:L3 will also light up):
   Enter the new 4-digit PIN with the buttons:
   8B: B3-B8. Do not use the code 3333.
   10B: B1-B8. Do not use the code 3333.
4. Repeat the new 4-digit PIN. During this step LED L3, L4, L5 and L6 will be lit for 8B and for 9BRS/10B LED L1, L2, L3 and L4 will be lit.
5. If PIN set OK L7 will be lit for 8B and L5 will be lit for 9BRS/10B. Restart the transmitter to activate the new setting.

7.4.2 Disable PIN code

Repeat the procedure in section 7.4.1

Enter the old PIN and 3333 as the new PIN (factory setting)

Restart the transmitter to activate the new setting.

7.4.3 Entering PIN code at start-up

When PIN is enabled the transmitter will not start to transmit before the correct PIN code is entered.

Indications when PIN locked:

8B: L3 and L4 will be lit and the status indicator will be steady RED.

9BRS/10B: L1 and L2 will be lit and the status indicator will be steady RED.

Enter the 4-digit PIN with the buttons B1-B8.

7.5 Shutdown Time of the Push Button Transmitter

The transmitter shuts down automatically if not used for a certain amount of time.
This time can be adjusted using the buttons on the transmitter.
For the numbering of the buttons see chapter 12.

1. Press button 9 (step 2) and button 5 while releasing the safety stop button. Hold the buttons for 3 seconds until the status indicator glows yellow (shall change from green to yellow) showing that the transmitter is in setup-mode.
2. Then select optional shutdown time by pressing button for the selected mode.
   - Button 3 = 2 minutes
   - Button 4 = 5 minutes
   - Button 5 = 15 minutes
   - Button 6 = no shutdown
3. Button LED glowing green indicates which button has been selected.
4. Restart the transmitter.

7.6 Shutdown Time of the Joystick Transmitter

The transmitter shuts down automatically if not used for a certain amount of time. Two switches on dipswitch SW1 can adjust this time (SW1:1 and SW1:2).

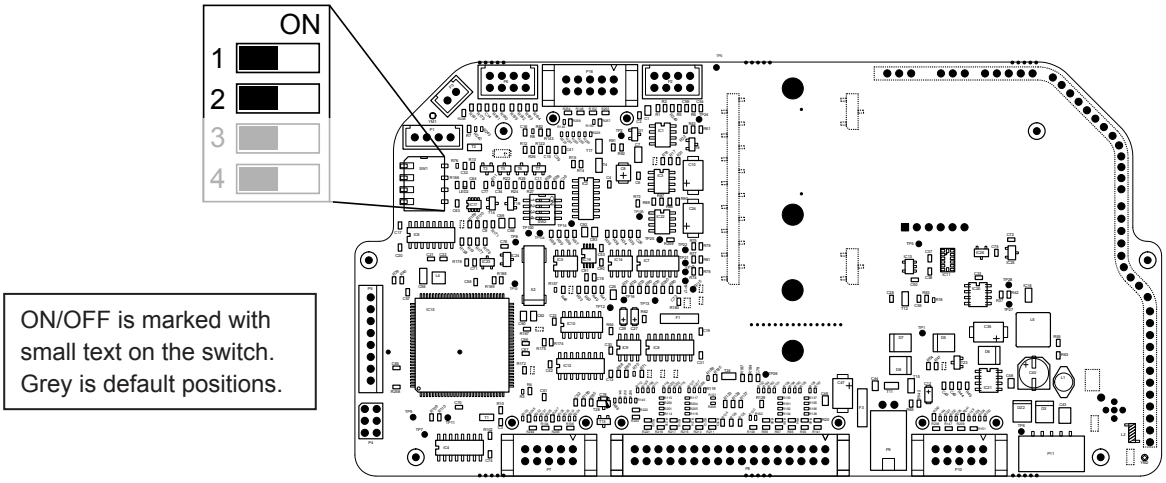


Figure 12. Dipswitch SW1 for shutdown time adjustment

Dipswitch SW 1		
Switch 1	Switch 2	Delay in minutes
OFF	OFF	2 (default)
ON	OFF	5
OFF	ON	15
ON	ON	No shutdown

Table 7. Settings for shutdown times on dipswitch SW1

7.7 *Micro (slow speed) Operation*

The SW3 dipswitch for adjusting micro setting is marked in Figure 3. See Figure 13 for settings.

Non simultaneous - SW3:3 OFF
The buttons/joysticks for movement are interlocked during this time so that only one movement can be operated at a time.

Simultaneous - SW3:3 ON
The buttons/joysticks for movements are looped so that two or more movements can be operated simultaneously.

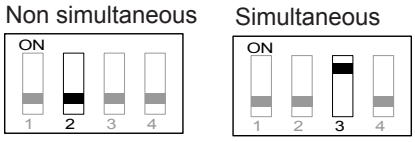


Figure 13. Micro operation setting, switch 3

! Note. Selection of simultaneous micro is not available for tandem/multi-operator operation.

7.8 *Tandem and Multi-operator Operation*

! **Only transmitters 9B RS, 9BD RS, 10B, 10BD and 150J.**

Tandem Operation

Tandem operation means that two cranes can be operated from the same transmitter, which makes it easier, for example to lift two objects simultaneously or a big object using two cranes.

A data link is needed between the two cranes. This link shall fulfil at least EN ISO 13849-1:2008 Performance Level c and category 2.

Multi-operator Operation

Multi-operator operation means that two transmitters can operate the same object. This can be beneficial, for example, when the view is blocked. The control of the object can be passed between two transmitters. Active crane selection and deselection guarantees that only one transmitter is in control of the object at a time.

Pairing

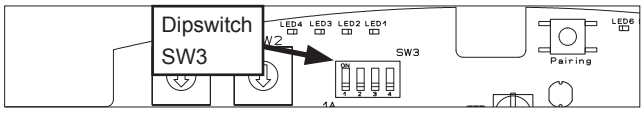


Figure 14. Dipswitch SW3, position in the receiver

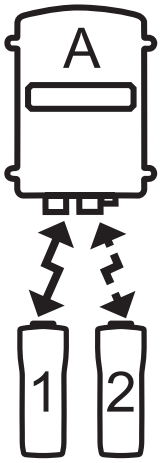
Follow the pairing instruction described in section 7.2, but notice the difference of SW3 when pairing the different transmitters and receivers. For settings of dipswitch SW3 see respective section.

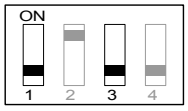
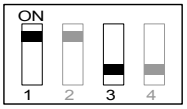
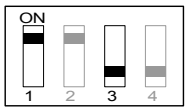
7.8.1 Multi-operator operation

2 transmitters and 1 receiver

In order to run multi-operator operation the receiver must be paired with two ID's. First paired transmitter = transmitter 1.

1. Pair transmitter 1 to the receiver. Disconnect and reconnect the power source to the receiver.
2. Pair transmitter 2 to the receiver. Disconnect the power source to the receiver, set the SW3 in "during operation" and reconnect the power source to the receiver



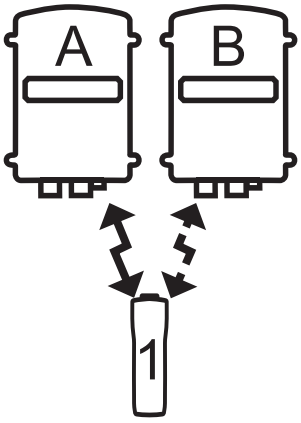
		During pairing	During operation
Receiver A	Transmitter 1	 SW3:1 OFF, SW3:3 OFF	 SW3:1 ON, SW3:3 OFF
	Transmitter 2	 SW3:1 ON, SW3:3 OFF	

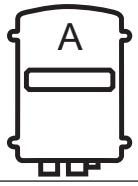
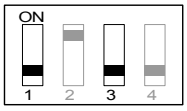
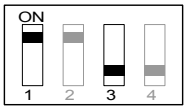
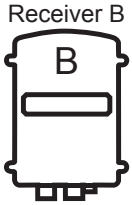
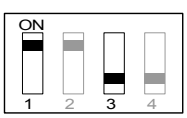
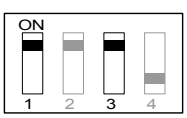
7.8.2 Tandem operation

1 transmitter and 2 receivers

In order to run tandem operation the receivers must be paired with the same ID.

1. Pair the transmitter to receiver 1 (A). Disconnect the power source to the receiver, set the SW3 in "during operation" and reconnect the power source to the receiver.
2. Pair the transmitter to receiver 2 (B). Disconnect the power source to the receiver, set the SW3 in "during operation" and reconnect the power source to the receiver.



		During pairing	During operation
Receiver A 	Transmitter 1	 SW3:1 OFF, SW3:3 OFF	 SW3:1 ON, SW3:3 OFF
Receiver B 	Transmitter 1	 SW3:1 ON, SW3:3 OFF	 SW3:1 ON, SW3:3 ON

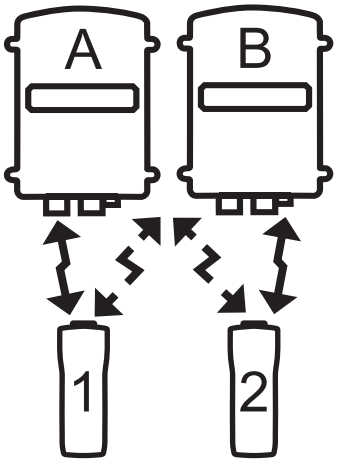
7.8.3 Tandem operator operation & Multi-operator operation

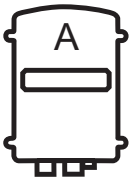
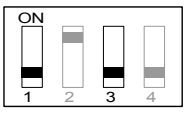
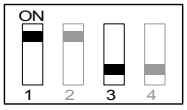
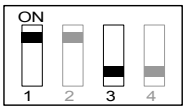
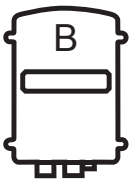
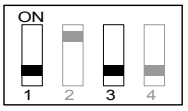
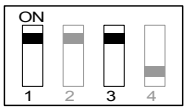
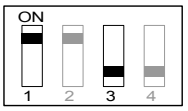
2 transmitters and 2 receivers

In order to run tandem/multi-operator operation the receivers must be paired with two ID's.

1. Pair transmitter 1 to receiver 1 (A). Disconnect and reconnect the power source to the receiver.
2. Pair transmitter 2 to receiver 1 (A). Disconnect the power source to the receiver, set the SW3 in "during operation" and reconnect the power source to the receiver.
3. Pair transmitter 2 to receiver 2 (B). Disconnect and reconnect the power source to the receiver.
4. Pair transmitter 1 to receiver 2 (B). Disconnect the power source to the receiver, set the SW3 in "during operation" and reconnect the power source to the receiver.

Transmitter 1 primary transmitter for receiver 1 (A). Transmitter 2 primary transmitter for receiver 2 (B).



		During pairing	During operation
Receiver A 	Transmitter 1	 SW3:1 OFF, SW3:3 OFF	 SW3:1 ON, SW3:3 OFF
	Transmitter 2	 SW3:1 ON, SW3:3 OFF	
Receiver B 	Transmitter 2	 SW3:1 OFF, SW3:3 OFF	 SW3:1 ON, SW3:3 ON
	Transmitter 1	 SW3:1 ON, SW3:3 OFF	

7.8.4 Tandem operator operation & Multi-operator operation (Primary/Secondary)

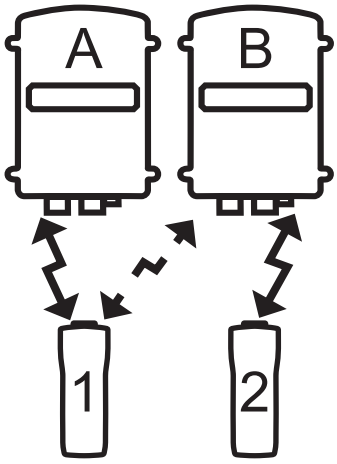
2 transmitters and 2 receivers (one of the transmitters can only operate one crane)

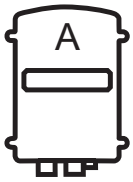
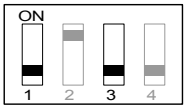
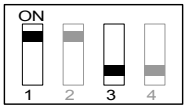
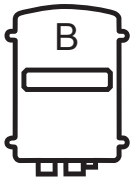
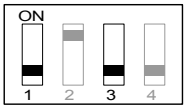
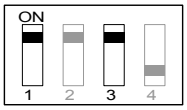
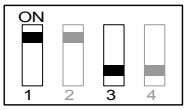
In order to run tandem/multi-operator operation the receivers must be paired with two ID's.

1. Pair transmitter 1 to receiver 1 (A). Disconnect the power source to the receiver, set the SW3 in "during operation" and reconnect the power source to the receiver.
2. Pair transmitter 2 to receiver 2 (B). Disconnect and reconnect the power source to the receiver.
3. Pair transmitter 1 to receiver 2 (B). Disconnect the power source to the receiver, set the SW3 in "during operation" and reconnect the power source to the receiver.

Transmitter 1, can operate both cranes, primary transmitter for receiver 1 (A) and secondary for receiver 2 (B).

Transmitter 2, can operate one crane, primary transmitter for receiver 2 (B).



		During pairing	During operation
Receiver A 	Transmitter 1	 SW3:1 OFF, SW3:3 OFF	 SW3:1 ON, SW3:3 OFF
Receiver B 	Transmitter 2	 SW3:1 OFF, SW3:3 OFF	 SW3:1 ON, SW3:3 ON
	Transmitter 1	 SW3:1 ON, SW3:3 OFF	

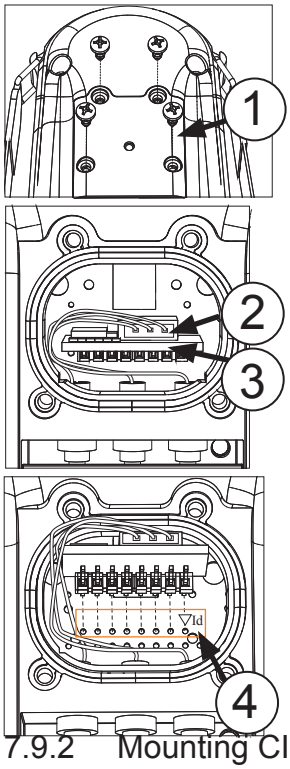
7.9 *CIM Card*

The CIM card is used for storing configuration information. You can take out the CIM-module from one system and place it in a spare transmitter with the same system program and it will work exactly the same.

This exchange has to be done in a clean, dry and ESD safe environment.

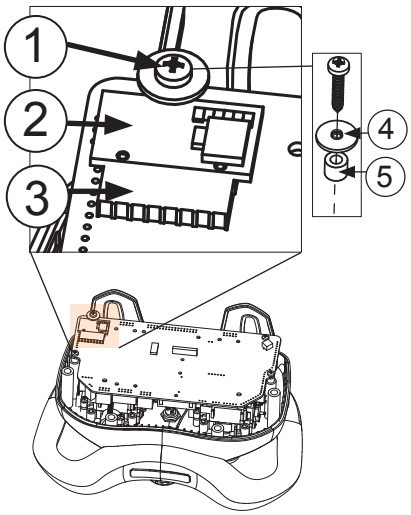
! **To avoid personal and or damages on property, exchange CIM card ONLY when the transmitter battery has been removed.**

7.9.1 Mounting CIM Card, Push Button Transmitter



1. Remove the battery. Unscrew the CIM card cover ①, 4 screws.
2. Gently remove the CIM card ③ straight up.
3. Pull out the 3-pole CIM card power supply ②.
4. Install the CIM card primarily in the original transmitter, alternative spare transmitter. Be sure to insert the CIM card in its connector, the upper row of holes, see labeling Key-Id ④.
5. Mount the power supply connector (note that the connection cables must be placed beside the CIM card).
6. Reinstall CIM card cover. The screws should be tightened with 1 Nm.
7. Insert battery. Now, the transmitter is ready for operation.

7.9.2 Mounting CIM Card, Joystick Transmitter



1. Remove the battery.
2. Unscrew the bottom of the transmitter; pull up the bottom of the transmitter carefully. Pull out the connector for the battery and remove the bottom cover entirely. Disassemble the mounting screw ① for the CIM card ②.
3. Assemble the CIM card primarily in the original transmitter, alternative spare transmitter, on the CIM card contact ③.
4. Tighten the mounting screw ① including nylon distance ⑤ and washer ④ with 1 Nm.
5. Remount the bottom enclosure, check position of rubber seal and make sure not to damage the battery cable. Tighten the screws 1 Nm.
6. Insert battery. Now, the transmitter is ready for operation.

8 Function tests

Before the following test is performed, make sure to prevent unintended movements of the controlled object from becoming a safety hazard.

Check that the transmitter can control the receiver by testing all functions and note if the output relays and the corresponding inputs on the controlled object are activated.

Follow the local safety regulations for the equipment and start the equipment as described in the Operator Manual.

Check the following:

- Are all movements correct?
- Do the other functions operate correctly?
- Does the stop function on the transmitter work properly?
- Also test the stop function by removing the battery in the transmitter.
- Is it possible to control the equipment from the normal controllers? If it is possible to operate the equipment from more than one controller at a time the system is incorrectly installed.
- There should be a changeover switch between radio/pendant controls to prevent control from two places at the same time.
- Test that all the safety and stop limits switches work.

This list of test is for reference only and can be extended by the system integrator in the specific installations and the corresponding risk analysis.

9 Indications

9.1 Receiver indications

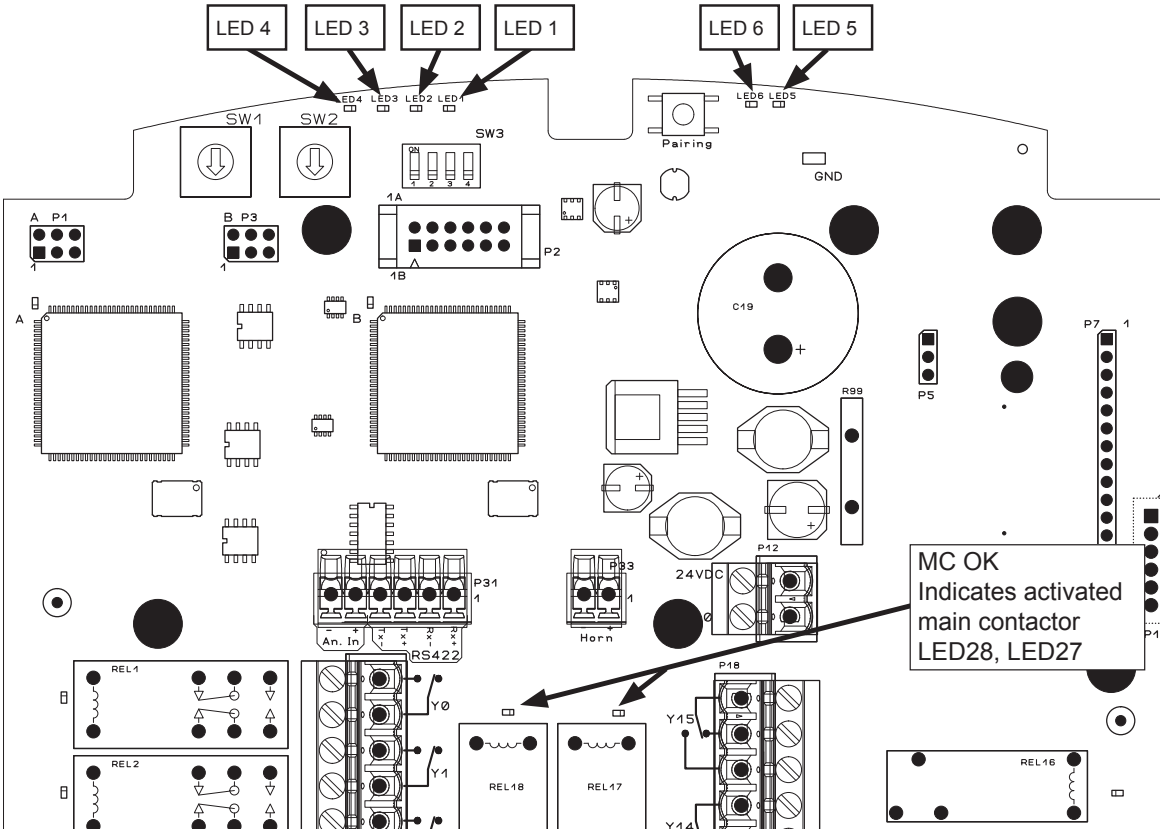


Figure 15. Indications on the MAIN board

Mode	Event	Indication on RX	Flash rate
LED 1-4			
TX command change	Changes in the transmitter switches or joysticks	LED 1 flashes	
Digital input data change		LED 2 flashes	
Message received		LED 3	
Squelch	Signal strength > -90 dBm	LED 4	
LED 5-6			ON/OFF
System OK	Not connected	LED 5 fast	50/50 ms
	Connected, MC=OFF	LED 5 slow	50/250 ms
	Connected, MC=ON	LED 5 extra slow	30/970 ms
	50% time out	LED 5 and LED 6 steady	
ERROR	Receiver internal error	LED 6 steady	
	Transmitter internal error	LED 6 fast	50/50 ms
Pairing	In pairing mode	LED 5 steady LED 6 fast	50/50 ms
	Paired	LED 5 steady	
LED 27-28			
MC activated		LED 27 & 28 steady	

Table 8. Mode, event and indications on the MAIN board

9.2 *Push button transmitter indications*

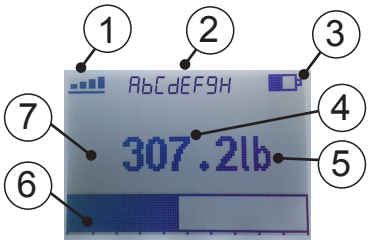
9.2.1 Status indicator

If the transmitter under start up (if not PIN locked) or operation detects a fault in any of the transmitters self-tests, the status indicator (see section 12.1) will indicate a continuous red light, after which the transmitter is shut down.

INDICATIONS	EXPLANATIONS
Green flashing	OK, normal operation
Yellow quick flashing	Battery voltage low <3.5 V
Yellow continuous, during operating	Battery empty. Transmitter will shut-off within 30s
Yellow continuous, at start-up	Configuration mode
Red continuous, at start-up + two top button LED	PIN locked
Red continuously, during operation	Hardware fault

9.2.2 Display indications (only 9BRS & 10B with display)

These symbols appear on the display by default. For configuration see RX160 configuration tool manual.



1. Radio signal / MC
2. Text field (crane id etc.)
3. Battery level
4. Weight, up to 5 digits
5. Weight unit (kg,t or lb)
6. Weight load graph (full-scale=max load)
7. Overload warning

9.2.2.1 Radio signal quality

Depending on the application this symbol can be enabled or disabled.

No radio link established	Weak signal	Good signal	Strong signal	Very strong signal
✕	▪	▪▪	▪▪▪	▪▪▪▪

MC on is indicated by a line beneath the radio signal symbol, example ▪▪▪▪.

9.2.2.2 Text field (crane id etc.) (option)

This text is configured in the receiver (8 characters) using the RX160 configuration tool.

9.2.2.3 Battery level

Depending on the application this symbol can be enabled or disabled.

Battery empty	25%	50%	75%	100% (fully charged)
▭	▮	▮	▮	▮

9.2.2.4 Weight / Graph / Overload (option)

The weight is shown with the unit symbol kg, ton or lb depending on the receiver configuration. The bar graph displays the weight load. Full scale= maximum load. The graph is only shown if a maximum weight limit is configured in the receiver.

This ⚠ symbol appears if the load on the crane reaches the weight limit (overload).

Refer to the RX160 configuration tool.

9.3 *Joystick transmitter indications*

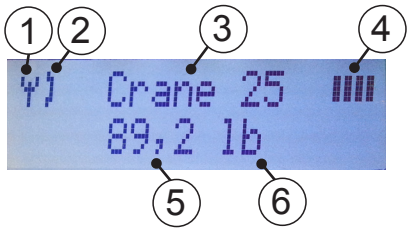
9.3.1 Status indicator

If the transmitter during start up or operation detect a fault in any of the transmitters self-tests the status indicator (see section 12.2) will indicate continuously red light, after that the transmitter will shut down. If one of the joysticks has a fault during start up it indicates a continuous yellow light.

INDICATIONS	EXPLANATIONS
Green flashing	Operating OK
Yellow flashing	Battery voltage low <6,9 V
Yellow continuous	Discharge battery voltage <6,1 V
Red continuous	Hardware fault

9.3.2 Display indications (only 150J with display)

These symbols appear on the display by default. For configuration see RX160 configuration tool manual.



1. Radio signal
2. MC
3. Text field (crane id etc.)
4. Battery level
5. Weight, up to 5 digits
6. Weight unit (kg,t or lb)

9.3.2.1 Radio signal quality

Depending on the application this symbol can be enabled or disabled.

No radio link established	Weak signal	Good signal
...	flashing	

9.3.2.2 MC

This symbol indicates if MC is activated or not.

MC OFF	MC ON

9.3.2.3 Text field (crane id etc.) (option)

This text is configured in the receiver (8 characters) using the RX160 configuration tool.

9.3.2.4 Battery level

Depending on the application this symbol can be enabled or disabled.

Battery empty	25%	50%	75%	100% (fully charged)

9.3.2.5 Weight (option)

The weight is shown with the unit symbol kg, ton or lb depending on the receiver configuration.

Refer to the RX160 configuration tool.

10 Trouble shooting

10.1 First check

On transmitter:

On push button transmitter:	On joystick transmitter:
Ensure that a charged battery is inserted in the transmitter.	Ensure that a charged battery is inserted in the transmitter.
The status indicator indicates following:	The status indicator indicates following:
• Slow green flashing means that the transmitter is fully operational	• Slow green flashing means that the transmitter is fully operational
• Fast yellow flashing means that the battery needs charging	• Fast yellow flashing means that the battery needs charging
• Steady yellow light means that the transmitter is in configuration mode	• Steady yellow light and shut down within 30 seconds means that the battery is completely discharged and that the transmitter will shut itself down within 30 seconds
• Steady red light at start up means that the transmitter is PIN locked	• Steady yellow light at start up means that a push button or joystick is activated or faulty
• Steady red light during operating means that an error in the transmitter has been discovered and it will shut itself down	• Steady red light means that an error in the transmitter has been discovered and it will shut itself down

In receiver:

Check the indications of mode “Error”, “MC activated” and “System OK”, see Table 8 on page 27.

10.2 It is impossible to activate the main contactor

For LED position see Figure 15.

Indication Squelch (LED 4) is flashing or lit but the transmitter is off.

- This means that some or all frequencies are used. Contact Åkerströms Björbo AB for advice.

Indication Message received (LED 3) does not flash and the transmitter is on.

- Check the antenna on the receiver.
- All the settings are correct on both the transmitter and the receiver; the system must be checked by authorised personnel.

Indication Message received (LED 3) lit and indication LED 5 lit but the main contactor remains deactivated.

- Check the instructions in the operator’s manual dealing with activation of the main contactor. Normally the horn/siren push button must be pressed to activate the main contactor. At start up the push buttons or joystick must be in not activated position.
- A fault in the receiver prevents the main contactor to be activated.

10.3 Some output functions do not work

If the LEDs indicate the output function the fault is likely to be found in the relay itself or in the cables/contacts or in the controlled units' electronics.

If no LEDs and indicate the output function the fault is likely to be found in the transmitter.

Note LED1 is flashing if a command is changed from the transmitter.

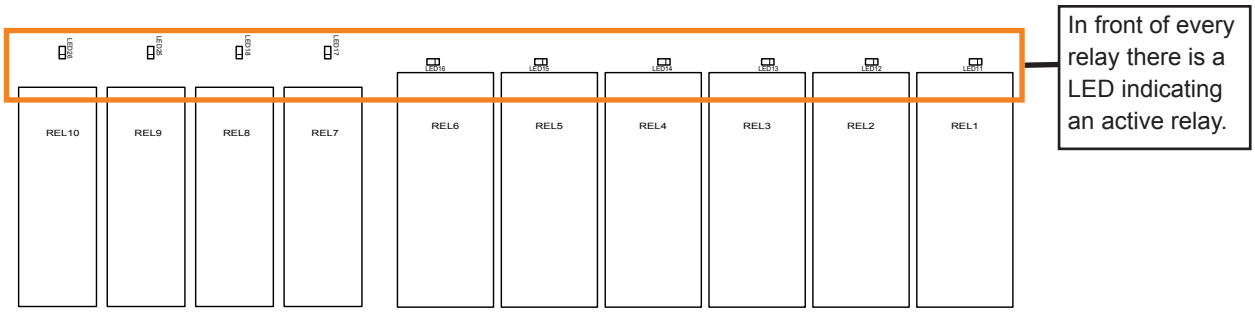
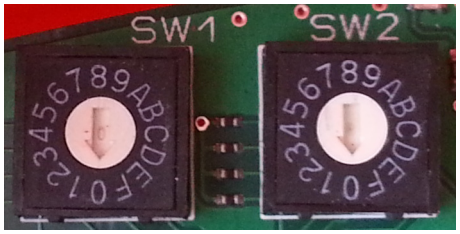


Figure 16. LED indicators indicating active outputs

11 Program Selection

There are two rotary switches for program selection in the receiver, see section 11.1. Rotary switch SW1 and SW2. For position on the main board see Figure 3 on page 10.



Note! The switches must be set to the same position.

11.1 Program Selection list

Every program option is for 3 movements and 2 steps. If nothing but the movement itself is described in the function column it means step 1+2 on the button transmitter. Low speed step 1 and high speed step 2. Accept button 10B there step 1 is micro and step 2 is function Y.

For symbols on the transmitter see chapter "12 Layout transmitters" on page 40.
For relay see "Figure 5. Relay symbol explanation" on page 12.

Safety relays (Y0-Y5) for movements is indicated by **bold text** in the function column**.**

! Difference in program selection at Tandem/Multi-operator operation

Program option 0:	! Not available for tandem/multi-operator operation.
Program option 1-D:	Y14 indication driver A and Y15 indication driver B
Program option 1,2,4,6,A,B,D:	Y13 interconnection crane A & B
Program option 3,5,7,8,9,C:	Y9 interconnection crane A & B

Program Option 0 - 12pc Single functions for JUPITER 800/900				
Terminal	Connector	Cable part	Function	
			10B/9BRS	**8B**
P21	Y4		**B1**	**B3**
	Y5		**B2**	**B4**
	Y6		B3	B5
	Y7		B4	B6
P27	Y8		B5	B7
	Y9		B6	B8
P20	Y10		B7	-
	Y11		B8	-
	Y12		B9	B9
	Y13		B10	B10
P18	Y14		RS: A	-
	Y15		RS: B	-

Program Option 1 - 3 outputs per movement			
Terminal	Connector	Cable part	Function
P15	Y0		**Bridge forward**
	Y1		**Bridge backward**
	Y2		**Trolley left**
	Y3		**Trolley right**
P21	Y4		**Hoist down**
	Y5		**Hoist up**
	Y6		Bridge high speed
	Y7		Trolley high speed
P27	Y8		Trolley 1/Selection 1
	Y9		Trolley 2/Selection 2
P20	Y10		Hoist high speed
	Y11		X
	Y12		Y
	Y13		A
P18	Y14		B
	Y15		Horn (Signal)

Program Option 2 - Different outputs for high speed up and down			
Terminal	Connector	Cable part	Function
P15	Y0		**Bridge forward**
	Y1		**Bridge backward**
	Y2		**Trolley left**
	Y3		**Trolley right**
P21	Y4		**Hoist down**
	Y5		**Hoist up**
	Y6		Bridge high speed
	Y7		Trolley high speed
P27	Y8		Trolley 1/Selection 1
	Y9		Trolley 2/Selection 2
P20	Y10		Hoist down high speed
	Y11		Hoist up high speed
	Y12		X
	Y13		Y / (Horn joystick)
P18	Y14		A
	Y15		B / (Horn button)

Program Option 3 - All high speed outputs are separately (X/Y function)			
Terminal	Connector	Cable part	Function
P15	Y0		**Bridge forward**
	Y1		**Bridge backward**
	Y2		**Trolley left**
	Y3		**Trolley right**
P21	Y4		**Hoist down**
	Y5		**Hoist up**
	Y6		Bridge forward high speed
	Y7		Bridge backward high speed
P27	Y8		Trolley 1/Selection 1
	Y9		Trolley 2/Selection 2
P20	Y10		Trolley left high speed
	Y11		Trolley right high speed
	Y12		Hoist down high speed
	Y13		Hoist up high speed
P18	Y14		X
	Y15		Y / (Horn joystick)

Program Option 4 - 3 outputs per movement + MC-ON function. (KONECRANES)			
Terminal	Connector	Cable part	Function
P15	Y0		**Bridge forward**
	Y1		**Bridge backward**
	Y2		**Trolley left**
	Y3		**Trolley right**
P21	Y4		**Hoist down**
	Y5		**Hoist up**
	Y6		Bridge high speed
	Y7		Trolley high speed
P27	Y8		Trolley 1/Selection 1
	Y9		Trolley 2/Selection 2
P20	Y10		Hoist high speed
	Y11		MC ON
	Y12		X
	Y13		Y / (Horn joystick)
P18	Y14		A
	Y15		B / (Horn button)

Program Option 5 - Outputs for low speed and high speed for each movement (X/Y function)			
Terminal	Connector	Cable part	Function
P15	Y0		**Bridge forward**
	Y1		**Bridge backward**
	Y2		**Trolley left**
	Y3		**Trolley right**
P21	Y4		**Hoist down**
	Y5		**Hoist up**
	Y6		Bridge low speed
	Y7		Bridge high speed
P27	Y8		Trolley 1/Selection 1
	Y9		Trolley 2/Selection 2
P20	Y10		Trolley low speed
	Y11		Trolley high speed
	Y12		Hoist low speed
	Y13		Hoist high speed
P18	Y14		X
	Y15		Y / (Horn joystick)

Program Option 6 - Different outputs for high speed up and down + MC ON function			
Terminal	Connector	Cable part	Function
P15	Y0		**Bridge forward**
	Y1		**Bridge backward**
	Y2		**Trolley left**
	Y3		**Trolley right**
P21	Y4		**Hoist down**
	Y5		**Hoist up**
	Y6		Bridge high speed
	Y7		Trolley high speed
P27	Y8		Trolley 1/Selection 1
	Y9		Trolley 2/Selection 2
P20	Y10		Hoist down high speed
	Y11		MC ON
	Y12		Hoist up high speed
	Y13		A / (Y button)
P18	Y14		B / (Horn button)
	Y15		X

Program Option 7 - All high speed outputs are separately (A/B function)			
Terminal	Connector	Cable part	Function
P15	Y0		**Bridge forward**
	Y1		**Bridge backward**
	Y2		**Trolley left**
	Y3		**Trolley right**
P21	Y4		**Hoist down**
	Y5		**Hoist up**
	Y6		Bridge forward high speed
	Y7		Bridge backward high speed
P27	Y8		Trolley 1/Selection 1
	Y9		Trolley 2/Selection 2
P20	Y10		Trolley left high speed
	Y11		Trolley right high speed
	Y12		Hoist down high speed
	Y13		Hoist up high speed
P18	Y14		A
	Y15		B / (Horn button)

Program Option 8 - Outputs for low speed and high speed for each movement (A/B function)			
Terminal	Connector	Cable part	Function
P15	Y0		**Bridge forward**
	Y1		**Bridge backward**
	Y2		**Trolley left**
	Y3		**Trolley right**
P21	Y4		**Hoist down**
	Y5		**Hoist up**
	Y6		Bridge low speed
	Y7		Bridge high speed
P27	Y8		Trolley 1/Selection 1
	Y9		Trolley 2/Selection 2
P20	Y10		Trolley low speed
	Y11		Trolley high speed
	Y12		Hoist low speed
	Y13		Hoist high speed
P18	Y14		A
	Y15		B / (Horn button)

Program Option 9 - Low speed in first step disappears in the second step (X/Y function)			
Terminal	Connector	Cable part	Function
P15	Y0		**Bridge forward low speed**
	Y1		**Bridge backward low speed**
	Y2		**Trolley left low speed**
	Y3		**Trolley right low speed**
P21	Y4		**Hoist down low speed**
	Y5		**Hoist up low speed**
	Y6		Bridge forward high speed
	Y7		Bridge backward high speed
P27	Y8		Trolley 1/Selection 1
	Y9		Trolley 2/Selection 2
P20	Y10		Trolley left high speed
	Y11		Trolley right high speed
	Y12		Hoist down high speed
	Y13		Hoist up high speed
P18	Y14		X
	Y15		Y / (Horn joystick)

Program Option A - Different outputs for high speed up and down. Transition from high speed to low speed – delayed 1s. (DEMAG, Dematek)			
Terminal	Connector	Cable part	Function
P15	Y0		**Bridge forward**
	Y1		**Bridge backward**
	Y2		**Trolley left**
	Y3		**Trolley right**
P21	Y4		**Hoist down**
	Y5		**Hoist up**
	Y6		Bridge high speed
	Y7		Trolley high speed
P27	Y8		Trolley 1/Selection 1
	Y9		Trolley 2/Selection 2
P20	Y10		Hoist down high speed
	Y11		Hoist up high speed
	Y12		X
	Y13		Y / (Horn joystick)
P18	Y14		A
	Y15		B / (Horn button)

Program Option B - 3 outputs per movement. Blocked 1s with zero position transition. (ABUS)			
Terminal	Connector	Cable part	Function
P15	Y0		**Bridge forward**
	Y1		**Bridge backward**
	Y2		**Trolley left**
	Y3		**Trolley right**
P21	Y4		**Hoist down**
	Y5		**Hoist up**
	Y6		Bridge high speed
	Y7		Trolley high speed
P27	Y8		Trolley 1/Selection 1
	Y9		Trolley 2/Selection 2
P20	Y10		Hoist high speed
	Y11		X
	Y12		Y
	Y13		(A)
P18	Y14		(B)
	Y15		Horn

Program Option C - Low speed in first step disappears in the second step (A/B function)			
Terminal	Connector	Cable part	Function
P15	Y0		**Bridge forward low speed**
	Y1		**Bridge backward low speed**
	Y2		**Trolley left low speed**
	Y3		**Trolley right low speed**
P21	Y4		**Hoist down low speed**
	Y5		**Hoist up low speed**
	Y6		Bridge forward high speed
	Y7		Bridge backward high speed
P27	Y8		Trolley 1/Selection 1
	Y9		Trolley 2/Selection 2
P20	Y10		Trolley left high speed
	Y11		Trolley right high speed
	Y12		Hoist down high speed
	Y13		Hoist up high speed
P18	Y14		A
	Y15		B / (Horn button)

Program Option D - Hoist low speed			
Terminal	Connector	Cable part	Function
P15	Y0		**Bridge forward**
	Y1		**Bridge backward**
	Y2		**Trolley left**
	Y3		**Trolley right**
P21	Y4		**Hoist down low speed**
	Y5		**Hoist up low speed**
	Y6		Bridge high speed
	Y7		Trolley high speed
P27	Y8		Trolley 1/Selection 1
	Y9		Trolley 2/Selection 2
P20	Y10		Hoist down high speed
	Y11		Hoist up high speed
	Y12		X
	Y13		Y / (Horn joystick)
P18	Y14		A
	Y15		B (Horn button)

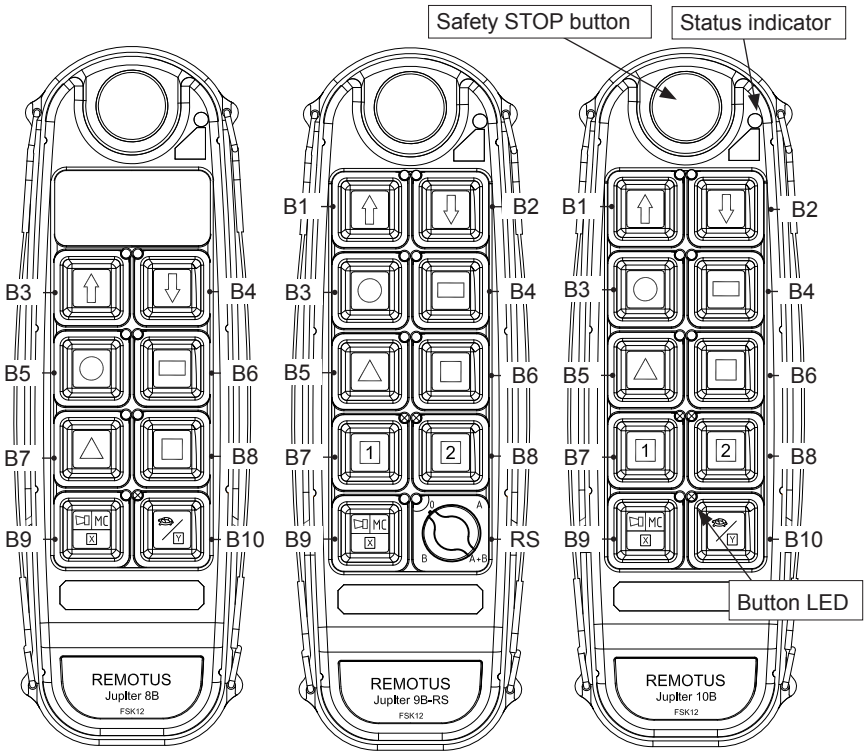
Program Option E - 3 outputs per movement with common movement indication output on Y12			
Terminal	Connector	Cable part	Function
P15	Y0		**Bridge forward**
	Y1		**Bridge backward**
	Y2		**Trolley left**
	Y3		**Trolley right**
P21	Y4		**Hoist down**
	Y5		**Hoist up**
	Y6		Bridge high speed
	Y7		Trolley high speed
P27	Y8		Trolley 1/Selection 1
	Y9		Trolley 2/Selection 2
P20	Y10		Hoist high speed
	Y11		X
	Y12		Common movement indication
	Y13		A
P18	Y14		B
	Y15		Horn (Signal)

Program Option F - 3 outputs per movement + MC-ON function Common movement indication output on Y12			
Terminal	Connector	Cable part	Function
P15	Y0		**Bridge forward**
	Y1		**Bridge backward**
	Y2		**Trolley left**
	Y3		**Trolley right**
P21	Y4		**Hoist down**
	Y5		**Hoist up**
	Y6		Bridge high speed
	Y7		Trolley high speed
P27	Y8		Trolley 1/Selection 1
	Y9		Trolley 2/Selection 2
P20	Y10		Hoist high speed
	Y11		MC ON
	Y12		Common movement indication
	Y13		Y / (Horn joystick)
P18	Y14		A
	Y15		B / (Horn button)

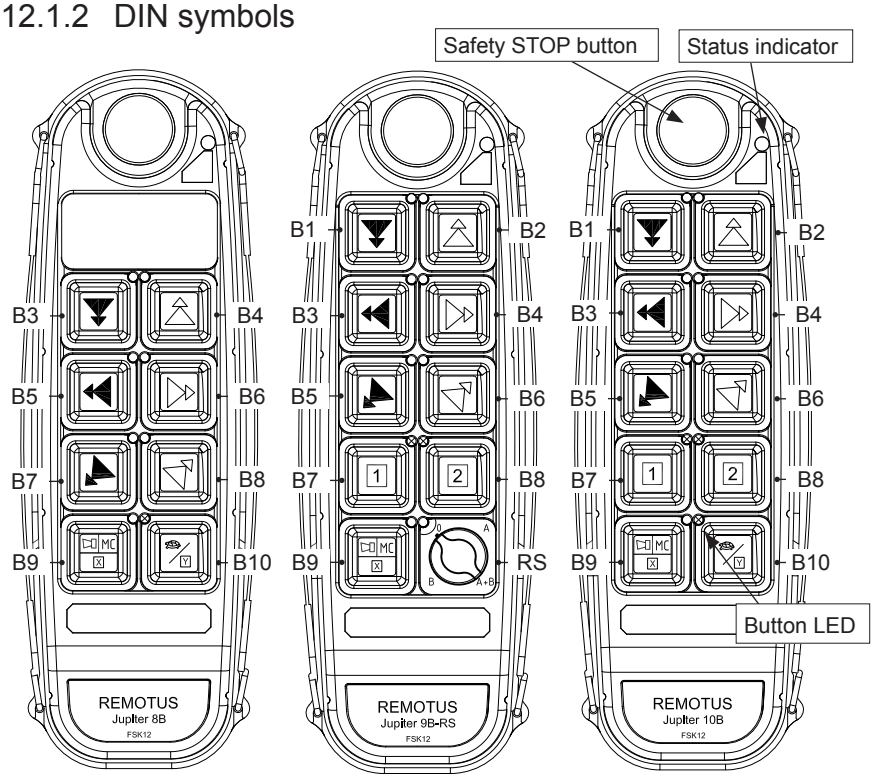
12 Layout transmitters

12.1 Button transmitters

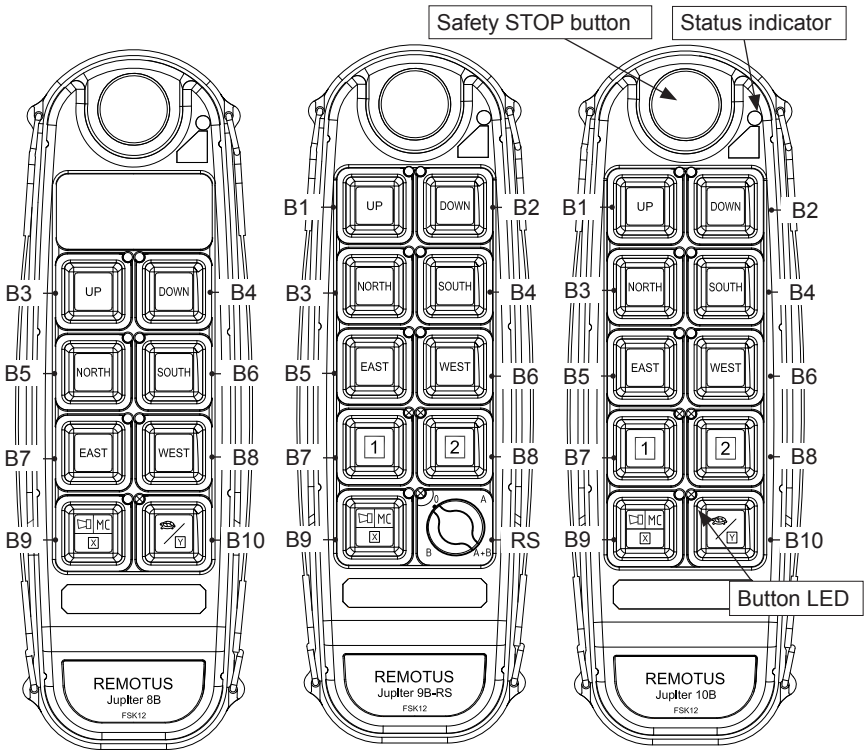
12.1.1 Nordic symbols



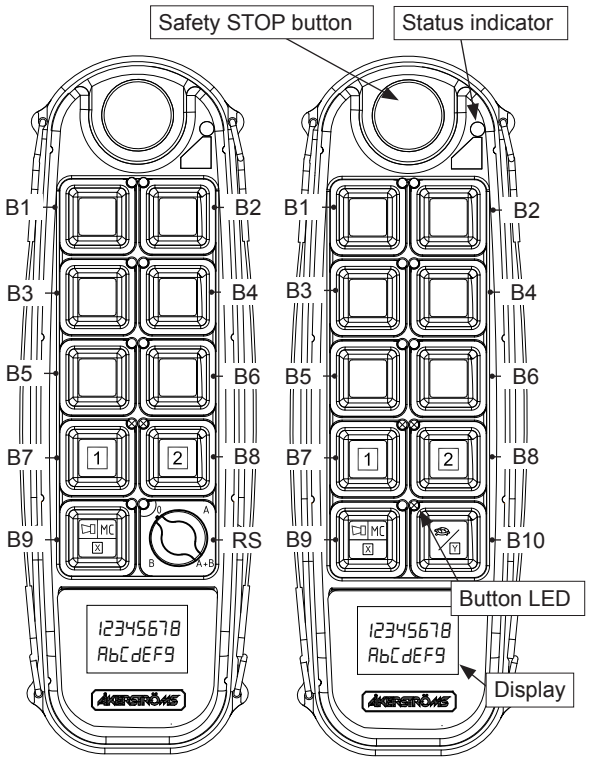
12.1.2 DIN symbols



12.1.3 CS symbols

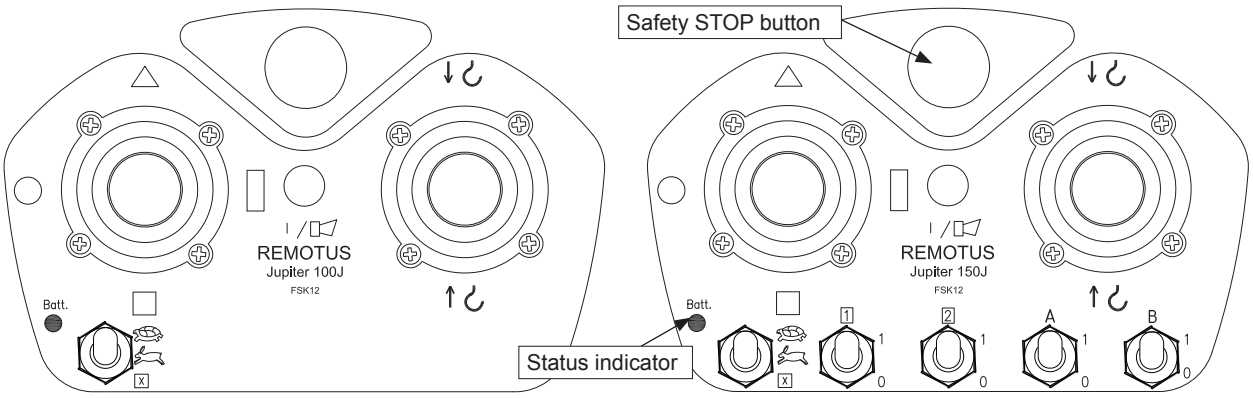


12.1.4 Button transmitter with display



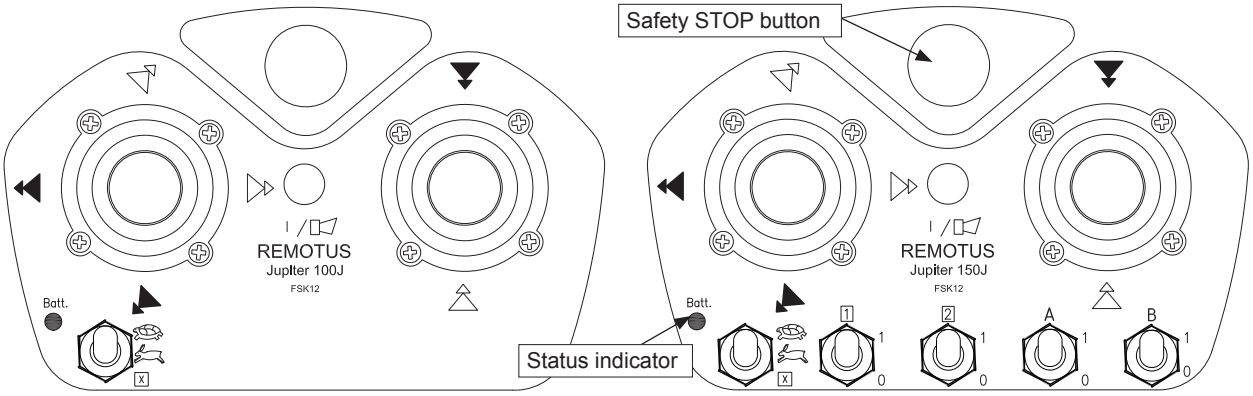
12.2 Joystick transmitters

12.2.1 Nordic symbols



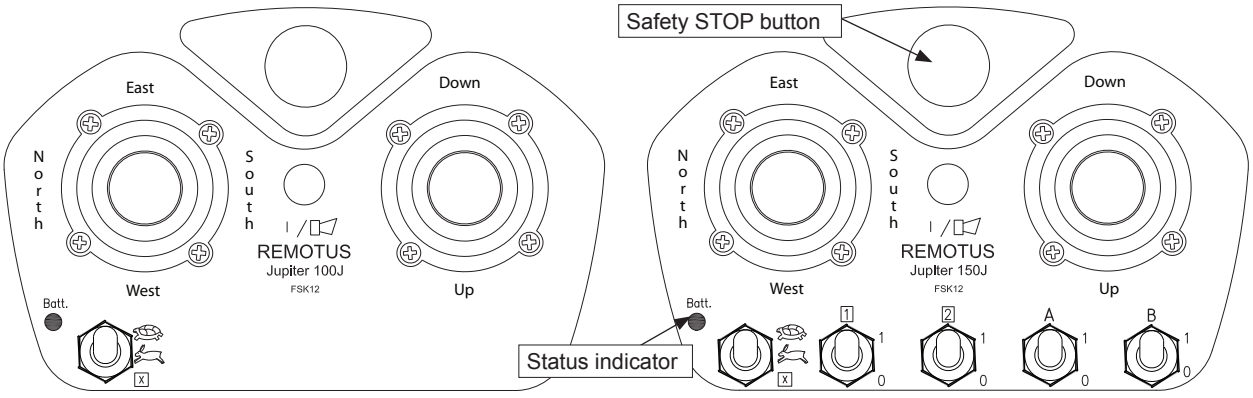
JUPITER 100J **JUPITER 150J**

12.2.2 DIN symbols



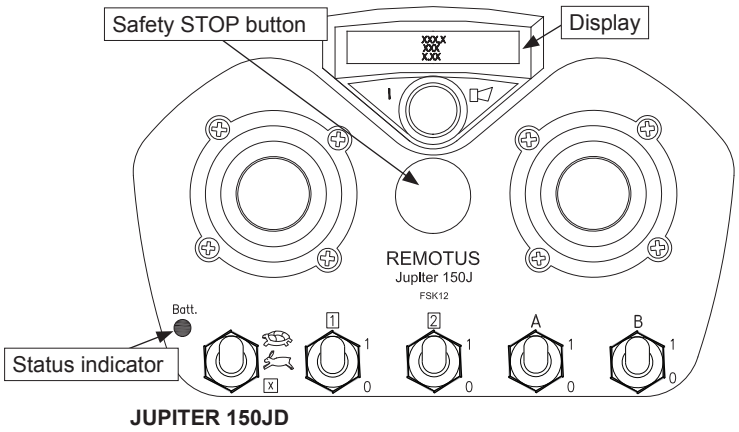
JUPITER 100J **JUPITER 150J**

12.2.3 CS symbols



JUPITER 100J **JUPITER 150J**

12.2.4 Joystick transmitter with display



JUPITER 150JD

12.3 Symbol explanation

Micro	Slow speed operation	
Normal	Normal speed	
Extra	Optional feature	X
Extra	Optional feature	Y
Siren		
Selection 1		1
Selection 2		2
Selection A		A
Selection B		B

NORDIC SYMBOLS:

Hoist	Up	/	Down	/
Trolley	Left	○	Right	▯
Bridge	Forward	△	Reverse	□

DIN SYMBOLS:

Hoist	Up		Down	
Trolley	Left		Right	
Bridge	Forward		Reverse	

CS SYMBOLS:

Hoist	Up	UP	Down	DOWN
Trolley	Left	NORTH	Right	SOUTH
Bridge	Forward	EAST	Reverse	WEST

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